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Mission ends as spacecraft enters Jupiter's atmosphere

Goodbye, GALILEO

THE GALILEO MISSION'S 14-YEAR ODYSSEY CAME TO AN END ON SUNDAY, SEPT. 21, WHEN THE SPACECRAFT PASSED INTO JUPITER'S SHADOW THEN DISINTEGRATED IN THE PLANET'S DENSE ATMOSPHERE AT 11:57 A.M. PACIFIC TIME. THE DEEP SPACE NETWORK TRACKING STATION IN GOLDSTONE, CALIF., RECEIVED THE LAST SIGNAL AT 12:43:14 PACIFIC TIME.

By Carolina Martinez and Mark Whalen

The delay is due to the time it takes for the signal to travel to Earth.

Hundreds of former Galileo project members and their families were present at JPL for a celebration to bid the spacecraft goodbye. There was sadness, to be sure, and more than a few tears were shed. But mostly it was a celebration—of awesome science, ingenious engineering, perseverance in the face of numerous obstacles.

"We learned mind-boggling things," said Galileo Project Manager Dr. Claudia Alexander. "This mission was worth its weight in gold."

Having traveled approximately 4.6 billion kilometers (about 2.8 billion miles), the hardy spacecraft endured more than four times the cumulative dose of harmful Jovian radiation it was designed to withstand. During a previous flyby of the moon Amalthea in November 2002, flashes of light were seen by the star scanner that indicated the presence of rocky debris circling Jupiter in the vicinity of the small moon. Another measurement of this area was taken Sunday during Galileo's final pass. Further analysis may help confirm or constrain the existence of a ring at Amalthea's orbit.

"I can't believe we collected science data all the way in," said Alexander. "What a machine."



magnetosphere long enough to identify its global structure and to investigate the dynamics of Jupiter's magnetic field. Galileo determined that Jupiter's ring system is formed by dust kicked up as interplanetary



Bob Brown / JPL Photolab

Clockwise, from top right: Galileo Project Manager Dr. Claudia Alexander; former project managers Jim Erickson (left) and Eilene Theilig; science panelists Randii Wessen (left), Dr. Torrence Johnson, Dr. Rosaly Lopes and Dr. Andrew Ingersoll; and former Galileo project managers John Casani (left) and Richard Spehalski.

The spacecraft was purposely put on a collision course with Jupiter because the onboard propellant was nearly depleted and to eliminate any chance of an unwanted impact between the spacecraft and Jupiter's moon Europa, which Galileo discovered is likely to have a subsurface ocean. Without propellant, the spacecraft would not have been able to point its antenna toward Earth or adjust its trajectory, so controlling the spacecraft would not have been possible. The possibility of life existing on Europa is so compelling and has raised so many unanswered questions that it is prompting plans for future spacecraft to return to the icy moon.

The on-Lab celebration featured panel discussions with former project managers and science team members, who offered testimonials and memories.

"There were a lot of great people working on this mission, the best on the planet," said Richard Spehalski, who managed the project at its launch in 1989.

"The whole mission has been overcoming one incredible obstacle after another," noted former manager Eilene Theilig. "It's really built a camaraderie and become one of the most special times of our lives."

Project Scientist Dr. Torrence Johnson said Galileo studied "a miniature solar system." "We haven't lost a spacecraft, we've gained a steppingstone into the

future of space exploration," he said. "It's been a tremendously exciting journey."

Added Dr. Rosaly Lopes, research scientist on the Galileo Near Infrared Mapping Spectrometer science team, "It's sad to say goodbye to an old friend.

But I've had the time of my life."

Also, NASA Administrator Sean O'Keefe telephoned the gathering to offer his congratulations. "This mission was a testimonial to the persistence of NASA even through tremendous challenges," he said. "It was truly a phenomenal mission."

Galileo was launched from the cargo bay of Space Shuttle Atlantis in 1989. The

exciting list of discoveries started even before Galileo got a glimpse of Jupiter. As it crossed the asteroid belt in October 1991, Galileo snapped images of Gaspra, returning the first ever close-up image of an asteroid. Less than a year later, the spacecraft got up close to yet another asteroid, Ida, revealing it had its own little "moon," Dactyl, the first known moon of an asteroid. In 1994 the spacecraft made the only direct observation of a comet impacting a planet—comet Shoemaker-Levy 9's collision with Jupiter.

The descent probe made the first in-place studies of the planet's clouds and winds, and it furthered scientists' understanding of how Jupiter evolved. The probe also made composition measurements designed to assess the degree of evolution of Jupiter compared to the Sun.

Galileo made the first observation of ammonia clouds in another planet's atmosphere. It also observed numerous large thunderstorms on Jupiter many times larger than those on Earth, with lightning strikes up to 1,000 times more powerful than on Earth. It was the first spacecraft to dwell in a giant planet's

meteoroids smash into the planet's four small inner moons. Galileo data showed that Jupiter's outermost ring is actually two rings, one embedded within the other.

Galileo extensively investigated the geologic diversity of Jupiter's four largest moons: Ganymede, Callisto, Io and Europa. Galileo found that Io's extensive volcanic activity is 100 times greater than that found on Earth. Europa, Galileo unveiled, could be hiding a salty ocean up to 100 kilometers (62 miles) deep underneath its frozen surface, containing about twice as much water as all the Earth's oceans. Data also showed Ganymede and Callisto may have a liquid-saltwater layer. The biggest discovery surrounding Ganymede was the presence of a magnetic field. No other moon of any planet is known to have one.

The prime mission ended six years ago, after two years of orbiting Jupiter. NASA extended the mission three times to continue taking advantage of Galileo's unique capabilities for accomplishing valuable science. The mission was possible because it drew its power from two long-lasting radioisotope thermoelectric generators provided by the Department of Energy.

Following Galileo's final minutes on Sunday, team members had some fun at own their expense with a song and comedy routine featuring "The Not Ready for Realtime Players." Based loosely on the hit television series "Survivor," through song parody they noted "voting off," among others, the balky high-gain antenna, the probe, the flight team, remote sensing and finally Galileo itself.

To the audience's delight, the Rolling Stones' "You Can't Always Get What You Want" became "You Can't Always Get the Science You Want." The lyrics to Three Dog Night's "Joy to the World" were sent up to include "If Europa has fishes in the deep blue sea, there's fame for you and me."

To view the end-of-mission webcast, go to <http://www.jpl.nasa.gov/webcast/galileo>.

Changes to 2004 benefits plans noted

By Mark Whalen

Due to rising health care costs and the prospect of JPL and campus employees paying significantly higher rates and having higher out-of-pocket expenses for coverage in 2004, Caltech has decided to replace the Blue Cross preferred provider organization (PPO), CaliforniaCare and Cigna health maintenance organization (HMO) plans with a new health care insurer, Health Net, effective Jan. 1, 2004.

In a recent enrollment newsletter sent to all benefit-based employees, Caltech President Dr. David Baltimore affirmed his commitment to providing a benefits program that meets the needs of employees and their families in a cost-effective manner. He cited studies of benefit plans, carriers and costs that showed current carriers requesting increases ranging from 15 to 25%.

“By consolidating most of our coverage with Health Net, we were able to preserve virtually all the service features and access to most of the physicians and hospitals of our current health care plans, while avoiding sharply higher premium and out-of-pocket costs for you and the Institute,” noted Baltimore.

Below is a summary of what is and is not changing in 2004. Caltech’s study showed that among other factors, Health Net offered competitive rates, the ability to stabilize Caltech’s plan design, a 95% physician match in HMO and a significant match of PPO network providers.

Employees will make their 2004 benefits selections during the open enrollment period, from Oct. 15–31. To assist in a smooth transition, Health Net representatives will be on Lab in October for one-on-one consultations, and seminars will be offered on Transition of Care and the Health Net prescription drug program.

Additional newsletters will provide details on long-term disability as well as annual enrollment instructions. If you have questions, call the Health Net dedicated line for Caltech employees at (800) 628-2707, visit the Health Net customized website at www.healthnet.com/caltech or call the JPL Benefits Office at ext 4-3760.

What’s Changing

Health care

- The Health Net PPO will replace the Blue Cross Prudent Buyer 500 plan
- The Health Net HMO will replace the Blue Cross, CaliforniaCare and Cigna HMO plans
- Rates will increase somewhat, but less than they would have had the changes not been made
- A new “employee/child(ren)” coverage level will provide more flexibility for some participants

Disability

A new Long-Term Disability (LTD) plan that protects everyone.

- Employees who are not currently enrolled in LTD will automatically be enrolled in a new basic LTD plan providing 40% salary replacement in the event of a long-term disability. The cost of the basic plan is paid by JPL. Employees have the option of enrolling in a supplemental plan providing a total of 60% salary replacement at a nominal cost. For this annual enrollment only, employees can enroll in the supplemental (60%) option without providing evidence of good health.
- Employees currently enrolled in LTD coverage will automatically be enrolled in the new supplemental (60%) plan at a nominal cost.

What’s Not Changing

Health care

- Kaiser will continue as a plan option
- Most out-of-pocket costs for deductibles, co-payments and co-insurance will not increase
- Delta Dental and Safeguard Dental Plan options
- Life and Personal Accident Insurance
- Flexible Spending Accounts

New DSN contract signed

JPL has awarded ITT Industries of White Plains, N.Y., a five-year, \$274-million subcontract for operations and maintenance of Deep Space Network facilities in the United States and for support of overseas facilities.

The contract includes incentive provisions that can extend the contract for an additional five years, increasing the contract value by an additional \$306 million.

The JPL-managed Deep Space Network is an international network of antennas that supports interplanetary spacecraft missions. The network also supports selected Earth-orbiting missions.

“The DSN is a critical element in achieving NASA’s mission,” said JPL Deputy Director Gene Tattini. “We welcome ITT as the newest member of the NASA community.”

ITT Industries will provide all necessary maintenance, operations and engineering support to operate and maintain JPL’s Goldstone Deep Space Communications Complex, located near Barstow; accomplish Deep Space Network operations and maintenance; support problem analysis and resolution; support network engineering efforts; and support radar and radio astronomy activities.

ITT will also support operations at the Deep Space Network facilities located in Madrid, Spain and Canberra, Australia.

ITT’s Systems Division, located in Colorado Springs, Colo., will perform the contract work. The contract start is Oct. 1 for transition planning; full responsibility for operations will be picked up on the new contract on Jan. 1, 2004.

Special Events Calendar

Ongoing Support Groups

Alcoholics Anonymous—Meetings are available. Call the Employee Assistance Program at ext. 4-3680 for time and location.

Caregivers Support Group—Meets the first Thursday of the month at noon in Building 167-111 (The Wellness Place). For more information, call the Employee Assistance Program at ext. 4-3680.

Codependents Anonymous—Meeting at noon every Wednesday. Call Occupational Health Services at ext. 4-3319.

Gay, Lesbian and Bisexual Group—Meets the first Friday and third Thursday of the month at noon in Building 111-117. Call the Employee Assistance Program at ext. 4-3680 or Randy Herrera at ext. 3-0664.

Parents Group for Children With Special Needs—Meets the second Thursday of the month at noon in Building 167-111.

Working Parents Support Group—Meets the third Thursday of the month at noon in Building 167-111. For more information, call the Employee Assistance Program at ext. 4-3680.

Tuesday, September 30

Investment Advice—Fidelity representatives will be available for one-on-one counseling. For an appointment, call (800) 642-7131.

JPL Hiking+ Club—Animator Zareh Gorjian of Section 382 will present “Volcanoes in Hawaii,” a 3-D slide show, at noon in Building 169-336.

Thursday, October 2

“A Conversation with Jack Valenti”—The head of the Motion Picture Association of America and former Johnson White House political adviser will speak at 8 p.m. in Caltech’s Beckman Auditorium. The format will be an open-ended conversation between Valenti and Los Angeles Times entertainment reporter James Bates. The event is free. A private reception and dinner will be held in Valenti’s honor prior to the event. For information, contact Susan Gray at (626) 395-6328 or e-mail her at graysm@caltech.edu.



JPL Gun Club—Meeting at noon in Building 183-328.

Friday, October 3

“Godel and the End of Physics”—Dr. Stephen Hawking will deliver this lecture at 8 p.m. in Caltech’s Beckman Auditorium. Tickets are free and will be distributed (maximum two per person) at 9 a.m. the same day at Beckman (not at the Caltech Ticket Office). Tickets will become void at 7:45 p.m. to allow remaining spaces to be filled.

Those who do not have tickets may come that evening to wait for available space or to be redirected to an overflow facility. The audio portion of the talk will be broadcast outside Beckman. For more information, call (626) 395-4652.

Monday, October 6

Garrison Keillor—The storyteller and author will read from his new novel, *Love Me*, at 8 p.m. in Caltech’s Beckman Auditorium. A book signing will follow. Free admission. For more information, call (626) 395-4652.

Tuesday, October 7

JPL Gamers Club—Meeting at noon in Building 301-227.

JPL Genealogy Club—Meeting at noon in Building 301-271.

Wednesday, October 8

Associated Retirees of JPL/Caltech—Meeting at 10 a.m. at the Caltech Credit Union, 528 Foothill Blvd., La Cañada.

Caltech Women’s Club—The annual Fall Gathering will be held in the gardens of the President’s residence from 11:30 a.m. to 1:30 p.m. Rain location is Avery House. Free childcare is available at the Children’s Center but must be reserved by Sept. 26. Call (626) 395-6860 for details. Lunch is \$12.50 (\$7.50 for students). Reservation deadline is Oct. 3. Questions: Karen Blake at (626) 351-4201 or kblake@its.caltech.edu.

JPL Amateur Radio Club—Meeting at noon in Building 238-543.

JPL Toastmasters Club—Meeting at 5 p.m. in the 167 conference room. Call Debbie Llata at ext. 3-3690.

Thursday, October 9

Rideshare Faire—Held as part of California Rideshare Week (Oct. 6–10) on the mall from 11 a.m. to 12:30 p.m. A prize drawing will be held at 12:15.

Friday, October 10

Michael Andrew and Swingerhead—A mix of swing, cha-cha, mambo, surf and lounge music will be performed at 8 p.m. on Caltech’s Beckman Mall. A dance floor will be set up outside of Beckman Auditorium. Tickets are \$15 for adults and \$5 for youth (high school age and younger). For more information, call (626) 395-4652.

Saturday, October 11

Afro-Cuban Salsa—Percussionist Bobby Matos and his band will perform at 8 p.m. on Caltech’s Beckman Mall. Dance lessons will be provided during intermission. Tickets are \$15 for adults, \$5 for youth (high school age and younger). For more information, call (626) 395-4652.

SRTM team honored; antenna goes to Smithsonian



Jim Rasmussen of Section 334 shows the SRTM outboard antenna structure before its departure earlier this month to the Smithsonian’s Udvar-Hazy Center at Dulles International Airport in Virginia, which opens in December. The SRTM display, which includes the mast/canister subsystem and outboard structure including the C-Band antenna panels and associated C-Band electronics, is scheduled to open early in 2004.

IN RECOGNITION OF THE EXCEPTIONAL SUPPORT PROVIDED as integral members of the JPL Shuttle Radar Topography Mission (SRTM) Ground Data Processing System Team, 23 individuals were recognized by the National Imagery and Mapping Agency at a Sept. 12 ceremony on Lab.

Awards were presented by Bobbi Lenczowski, NIMA’s chief scientist, and Tom Hennig, NIMA’s SRTM program manager, to individual team members involved in day-to-day SRTM data processing.

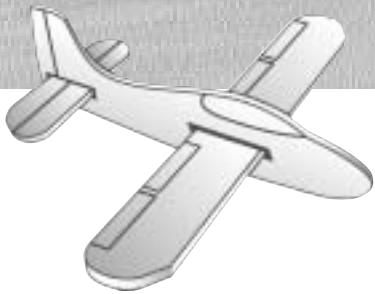
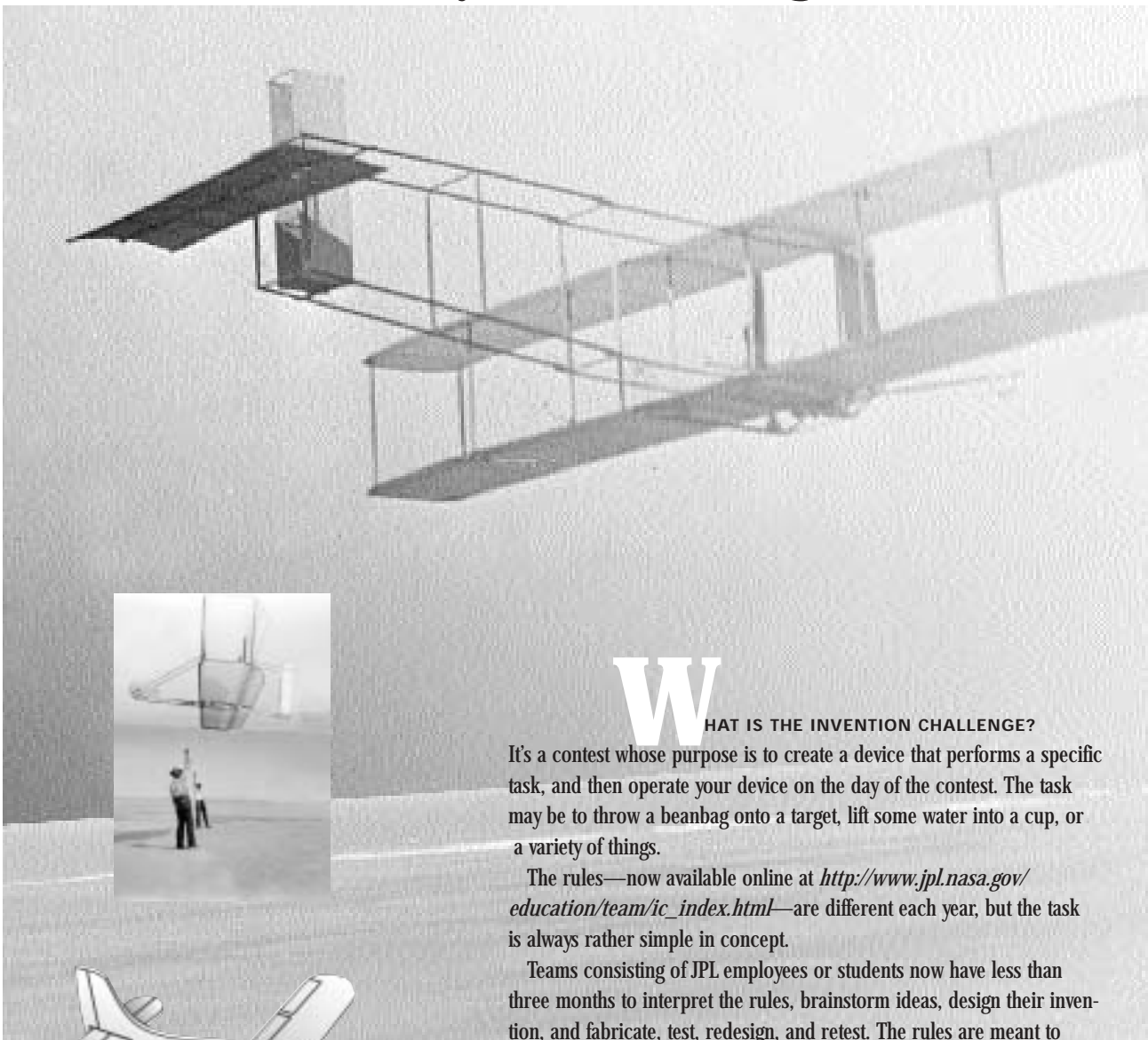
More than 14,000 one-degree-by-one-degree height and image data products over the Earth were delivered to NIMA on schedule, and analyses by both NIMA and JPL indicate the performance well exceeds the mission performance accuracy specification.

James Clapper Jr., Lieutenant General, U.S. Air Force (Ret.) and director of NIMA, signed a plaque citing team members’ “dedication and commitment, which will help NIMA, its customers in the Department of Defense and the intelligence community, and the public at large, satisfy a multitude of critical requirements for terrain elevation data for years to come with the help of this unique dataset.”

The following team members received awards:

John Eric Belz, Elayne Brown, Leland Bunker, James Cowan, Eric Gurrola, Scott Hensley, David Imel, Yunjin Kim, Peter Kroger, Joseph Kwan, Jan Martin, Charles Morris, Mike Papin, David Perz, Joe Reymann, Ernesto Rodriguez, Paul Rosen, Joanne Shimada, Brian Swift, Mark Tarbell, Lori Udovich, Theresa Wright and Mathew Yeates.

Pre-Holiday Fun: Imagine That!



WHAT IS THE INVENTION CHALLENGE?

It's a contest whose purpose is to create a device that performs a specific task, and then operate your device on the day of the contest. The task may be to throw a beanbag onto a target, lift some water into a cup, or a variety of things.

The rules—now available online at http://www.jpl.nasa.gov/education/team/ic_index.html—are different each year, but the task is always rather simple in concept.

Teams consisting of JPL employees or students now have less than three months to interpret the rules, brainstorm ideas, design their invention, and fabricate, test, redesign, and retest. The rules are meant to structure the competition, but not stifle the imagination and creative spirit of the contest.

HOW DID YOU COME UP WITH THE IDEA?

When my son, David, was in 7th grade, his science teacher challenged her students to take two ordinary balloons and make a car that would travel the farthest. We worked on it together, using cardboard, glue, tape and straws. His car traveled about 15 feet and actually won the contest.

This simple task was so much fun that I thought my co-workers in the Instrument Design and Analysis Group would enjoy a light-hearted, fun-filled contest held in December just before the Christmas break. The first Invention Challenge was held in 1998. The rules for that contest were exactly the same as those for my son's assignment—create a car that travels the farthest using two balloons.

WHO RUNS IT? DO YOU HAVE SPONSORSHIP (CORPORATE, ACADEMIC OR OTHER?)

Each year my partner, Richard Alvidrez from the JPL Education Office, and I visit local venues to spread the word. This year we went to a Greater Los Angeles Teachers' Science Association conference; the Los Angeles County Science Fair; the Math, Engineering, Science Achievement (MESA) workshop in August; and the AIAA Space Conference held earlier this week (Sept. 23–25).

MESA promotes science and math in middle schools and high schools, and helps underprivileged schools by providing bus transportation and other functions. Last year they helped encourage more than six schools to enter in the contest, and I feel that their influence will spread to more schools every year.

We have neither corporate sponsors nor any budget at JPL except for some help in putting on the live webcast last year and generating some flyers, posters and banners.

WHAT KINDS OF "CHALLENGES" HAVE YOU HAD IN THE PAST?

In 1998 Chris Stell and Gene Wester created a car by stretching their balloons, tying a fishing line to the balloons, and then wrapping the fishing line around the axle to allow their car to travel more than 70 feet. The next year, contestants fashioned devices to launch a foot bag (HackeySack) onto a target about 16 feet away. Chris Wrigley's device consisting of a copper tubing weldment, a laser sight, a spring and an ice cream scoop landed only 4 3/4 inches from the target.

In 2000, the challenge was to create a device to transport a half-gallon of water from a fish tank into a cup in the fastest time. Mike Blakely's entry essentially pushed the water using over 100 pounds of weight through a syringe-like assembly and a series of pipes. His time was 1.86 seconds. In 2001, water balloons were launched straight up as high as possible to have the balloon land within a 23-foot-diameter circle. Richard Goldstein achieved a height of more than 135 feet.

Last year, devices launched 50 jellybeans at a target about 16 feet away. The JPL winning team led by Gary Gray scored 145 points and the winning student team from Frazier Mountain High School scored 132 points.

HAS THERE BEEN ONE THAT WAS ESPECIALLY DIFFICULT OR FUN?

The contest that was the most fun was last year's jellybean toss. Just the name in itself sounds like fun, and I think all the participants had fun. The most challenging contest was the water balloon launch, due to the large size and power of each of the entries.



Now in its sixth year, the JPL Invention Challenge has grown in scope and popularity. It's organized by Paul MacNeal, a senior member of the technical staff in Section 352, who discusses the contest's history and this year's event.

HOW MANY STUDENTS AND JPLERS PARTICIPATE?

In past years, I have had as many as 40 JPL entries and

25 student team entries. Last year more than 300 students visited JPL on contest day. Each year, between 150 and 300 JPL employees, friends and family watch the contest.

HOW IS THIS YEAR'S CHALLENGE DIFFERENT?

This year's challenge is the "Wright Turn Glider Contest." The objective is to create a glider that will navigate a right-hand turn and land on an "X" located 40 feet away. This is the first year where flying has been incorporated, as opposed to launching.

Children of JPL employees can show their science or math teacher the website I mentioned earlier and encourage them to form a team and enter the contest, even for this year. The deadline for turning in student team entries is Oct. 3.

We plan to hold regional contests in November. The top 20 entries from the regionals will be invited to participate in the JPL contest on Dec. 5.

JPL entry forms can be turned in as late as Nov. 26, as long as there are still openings.

WHAT KIND OF IMPACT HAS THE CHALLENGE HAD ON THE COMMUNITY?

The Challenge allows many schools and classrooms to participate in an activity that provides authentic and powerful learning through design and invention. This is a great thinking leap above assembling and manipulating devices.

It's particularly valuable where teachers may not have a lot of technical expertise, or in cases where the school cannot commit to a large cost or time requirement. The entry bar is low—less than \$50—and the Challenge stimulates good old-fashioned imagination that might nurture "the next generation of explorers ... as only NASA can." The Challenge has become part of the curriculum in some schools, and we expect this to continue and expand.

Last year, a teacher, Melody Yang of First Avenue Middle School in Arcadia, took the Invention Challenge to heart. She required all 120 of her students to design a jellybean-tossing device and talk about it in front of the classroom. One student who had never participated in class discussions instantly became an enthusiastic participant in the Invention Challenge and even volunteered his own house for practice sessions. This was an inspiration for Melody. She had the winners of their school competition come to JPL for the contest.

Every year we get some positive media attention, which is an extra bonus for the student teams, and for JPL as well.

WHAT IS YOUR HOPE FOR THE FUTURE?

I hope all schools throughout the nation will be able to participate. Because the cost of holding the competition is relatively low, I feel that other venues can be made available. I would like to see other NASA centers and major aerospace companies throughout the United States host the annual contest at their own locations. Also, many universities that receive space grants from NASA could be encouraged to host as well. The MESA organization is nationwide, and their infrastructure could be used to help this vision come true.

On a local scale, I hope that word-of-mouth spreads throughout the middle schools and high schools to encourage more participation. As the contest grows, I hope that more JPL teams will form because this is truly an amazing contest that allows the creativity and imagination of all who enter to shine.

Photos of Paul MacNeal by Bob Brown/ JPL Photolab

Informal education supplements classwork

By Susan Braunheim-Kalogerakos

JPL exhibit at right is featured at the Boston Museum of Science.

JPL'S ONLINE NEWS SOURCE



Classified ads will be available the day before Universe is published at <http://dailyplanet>

View this and previous issues of Universe at <http://universe.jpl.nasa.gov>

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Notice to Advertisers

Advertising is available for JPL and Caltech employees, contractors and retirees and their families. No more than two ads of up to 60 words each will be published for each advertiser. Items may be combined within one submission. Ads must be submitted via e-mail to universe@jpl.nasa.gov and are due at 2 p.m. on the Monday after publication for the following issue.

All housing and vehicle advertisements require that the qualifying person(s) placing the ad be listed as an owner on the ownership documents.

JPL'S INFORMAL EDUCATION OFFICE IS PARTNERING with museums, science centers and planetaria all over the country to help spread the JPL story.

Currently, JPL works with more than 100 institutions of various sizes on exhibit and artifact loans, professional development, curriculum development, and multimedia material. JPL provides the institutions with a reliable source of information and resources. Through these venues, people across the nation learn about JPL's work.

Informal education—also known as “lifelong” or “free-choice” learning—happens outside the formal classroom as people of all ages continue to seek knowledge and enrich their lives.

JPL's collaborations include the California Science Center, Kidspace, the Skirball Cultural Center and Natural History Museum in Southern California; National Air and Space Museum in Washington, D.C.; the American Museum of Natural History and Hall of Science in New York; Adler Planetarium in Chicago; and Chabot Space and Science Center in Oakland. JPL has also been a resource for the developers of a national touring exhibit, “SPACE: A Journey to Our Future,” which opens at Seattle's Pacific Science Center on Nov. 22.

JPL's partnership with Chabot has been particularly successful. Both institutions are extremely dedicated to the alliance. JPL has provided webcasts, artifacts for the new “Mars Encounter” exhibit, as well as role models, field trip opportunities and planetarium programming. Chabot offers these resources to diverse groups of students and families including underserved populations.

Retirees

The following JPL employees retired in September:

Billie Le Clerg, 43 years, (former) Division 240; Dale Thornton, 41 years, Section 357; Gary Milam, 36 years, Section 356; Donald Collins, 35 years, Section 381; Danal Snyder, 30 years, Section 357; Anne Kahle, 29 years, Section 324; Ernest Stone, 26 years, Section 336; Juana Reyes, 20 years, Section 349; Marian Meridieth, 13 years, Section 349; Thomas West, 13 years, Section 102.

Letters

My family and I wish to express our sincere appreciation for the beautiful flower arrangement from my friends and co-workers in the Office of the Director in the passing of my father. I would also like to thank JPL and ERC for the beautiful plant. I will do my best to nourish and keep it in honor and remembrance of my father, Pasquale.

Frances Castellaneta

Thank you, Division 36 and Section 361, for your support and thoughtful plants and cards following the passing of my father, Walter Donald.

Marj Burris

I wish to thank my friends and co-workers for the kindness extended to me on the recent passing my mother, Sylvia Silverman.

Steve Silverman

Classifieds

For Sale

AQUARIUM, 35-gal., glass eclipse tank with hood, light, heater, air pump, filter, no stand; \$75 /obo. 626/836-4960.

ARMOIRE, rustic pine; \$250 firm. 249-0528.

BOOTS, Talbots brand, ladies 8M, brn. leather, tall w/zipper, round toe, 1 1/2" flat heel, worn 2x's, virtually new, \$40; LADIES SLING HEELS, Naturalizer, "Alison" leather, 1 1/2" heel, 8M, 1 pr. rose red, 1 pr. saddle tan, like new, \$15/ea.; pics @ JPL Store. 626/296-3782, Jeanne.

CAMERA, APS Yashica Profile 4000IX, like new, metallic silver; \$100/obo. 323/208-2329.

CHAIRS, 4 deep burgundy leather w/arms, brass nail heads, high-quality & classic design; orig. \$600 each, approx 13 y/o, great cond.; \$50/ea. or 4/\$175, pics @ JPL Store. 626/296-3782, Jeanne.

CHIPPER/SHREDDER, Craftsman, 8.5 hp, 14:1 reduction ratio; \$325/obo. 790-1520.

COFFEE MAKER, Braun 10-cups, white/black, like new; \$30 obo. 626/791-6101.

COMPUTER POWER CONTROL CENTER, 5 power switches + 1 master switch, 5 surge-protected outlets and 2 modem/fax/phone jacks, new, \$20; ORGAN, Yamaha 415 electronic w/13 pedals, 3 keyboards, 144 rhythm patterns, \$2,000. 790-3899.

DESK, writing trestle style, solid maple, 44' long, with plate glass top; matching rolling chair; excellent cond., \$199. 626/791-9154.

DIGITAL CAMERA, Mino Ha Dimage S-414, 4 megapixels, 4x optical zoom, brand new in original box; comes with case, 64 MB compact flash, reader. 626/917-0231.

DINETTE, 3' x 5', 6 chairs, \$350 firm. 249-0528.

DINING SET, all slate blue; 2 large oval tablecloths, 18 placemats, 18 napkins with napkin rings; good condition, \$50 all; SHOVELS, \$2. 626/357-8210.

DINING SET/HUTCH, ceramic top table, matching hutch, & 6 chairs; leaf also incl. to expand table, solid oak constructed, hand-painted glazed roses & matching grout, med. oak finish, flower pattern cushioned chairs all in gd. cond.; located in Burbank; \$1,200 takes all, over \$2,300 new. <http://www.cathouse-fcc.org/other/hutch.html>. 841-2574, Eric.

DOG HOUSE, Dogloo II igloo style, w/vent in roof; outside dimensions about 36" x 36," for med.-sz. dog; gd. condition, about 3 years old; \$40/obo. 909/596-4390.

DOG HOUSE, Dogloo XT for small dog, up to 45#; good condition; \$35. 626/303-1927.

ETHERNET NETGEAR SWITCH/ROUTER, 5-port; model FS605, 10/100 Mbps LAN, great for home networking to DSL, less than 1 yr. old, \$25. 626/296-8559 or chad-edwards@sbcglobal.net.

FERTILITY TEST STICKS, Clear Plan, partial box of 19 out of 30; expires 5/2004; pd. \$45/box, sell for \$20/partial box. 714/655-2204.

HOME BREWING KIT, complete supplies including glass carboy; \$45. 626/794-1319.

JUICE EXTRACTOR, Oster, automatic, gd cond.; \$20/obo; MIXER, Sunbeam Deluxe Mixmaster Mixer, table-top, 12 spd; incl. turntable, bowl-fit beaters & mixing bowls, used only a few times, exc. cond., chrome; \$75 obo; ESPRESSO MACHINE, Krups Novo compact model #989, \$50/obo. 323/208-2329.

LIFT CHAIR, electric lift full recliner w/massager & heater; burgundy, exc. cond., fully functional, max lift weight 250 lbs; paid \$750 + tx., make offer. rescobedo@cfecu.org.

MOVING SALE: AIWA stereo NSX-V70, \$75; walking treadmill, \$25; fan heater w/humidifier syst., \$25; Hamilton Beach blender, \$10; bookshelf, \$10; beach chairs, 2, portable, \$5; all-purpose pot, 4-pc. set, \$10; fan, \$3. 626/405-1539.

PORT REPLICATOR for IBM Thinkpad, works with T20, T21, A20, A21, or X, R series, like new, \$85; CARD SHUFFLER, Johnson, collectable, all metal construction with the exception of the friction wheels which drive the cards and the carved-wood dowel handles; stands ~6" handle-high, and ~9" by 6", flanges and handle inclusive; \$35; DIET TAPES Jenny Craig, set of 14, \$50. 790-3899.

REFRIGERATOR, Kenmore, with ice maker, 14 cu ft., white, 29.75" W, depth 29" D, 65.5" H; 3 yrs old, exc. cond., \$350/obo. 626/446-2989.

SCANNER, Microtech Scan Master X6EL, PC or Mac compatible, scans up to legal size + photo neg. scanner; Photoshop 4.0LE and OCR software; used only a few times; \$30. 626/303-1927.

SOCCER CLEATS, men's Puma Cellerator, GCI FG; brand new, never used; men's size 8, women's size 9.5; retail \$165 + tax, sell \$80; see photo w/ad at JPL Store and <http://www.soccer.com>. 846-1280, Nancy.

SOFA BED, gold tones, exc. cond., \$35. 249-4646.

SOFA/LOVESEAT, natural color with decorative pillows, exc. cond., both clean, like new; \$400; FITNESS EQUIPMENT, Jake's Hip and Thigh machine, \$30. 626/294-0499.

TILES, elegantly designed, glazed, non-skid, tan/ivory, 18" x 18"; 272 tiles total, bought \$6/ea., sacrifice \$2.50/each. 956-2234, Rose.

TREADMILL, Trainium by DP, personalized workout, incline control, programmable speed, stop key/safety switch, air step cushion deck, calorie count, \$200; MOUNTAIN BIKE, Trek 9900, OCLV carbon frame, Answer Manitou shocks, Answer A.TAC headset, Shimano Deore Lx brakes, Mavic rims, \$300; COFFEE TABLE FRAME, cast iron, dark brown, 4' x 4', needs glass, \$50. 244-8822.

TREES, red banana plant, 5' tall, \$60/obo; fish tail, 6' tall, \$80/obo; ficus tree, 10' tall, braided in 30" plastic pot, \$250/obo; ceramic bowl, gray, 2' diameter with planted geraniums, \$40/obo. 626/791-6101.

VIDEO/DVD/CD CABINET, Ikea, blk and birch, \$40; SCUBA GEAR/TANK, BCD. 957-3296.

WINDSURFING EQUIPMENT, sails (4-6 m.), booms and more, very cheap; nothing over \$50. 626/448-3694.

Vehicles/Accessories

'96 BMW M3, black on black, sunroof, tinted windows, cruise, computer, excellent condition, 64.5K mi, \$17K/obo. 613-3741.

'73 CHEVY Nova, 2 door, 350 V8, auto, p/s, p/b, Cragar wheels, new custom upholstery, new front tires, needs some engine and body work, \$1,800/obo. 661/296-6260.

'00 CHRYSLER Sebring JXI convertible, gold w/blk. top, leather int., 33K mi., \$9,500. 790-1520.

'96 CHRYSLER Town & Country LXi minivan, 125K mi., exc. cond., tow pkg., \$7,300/obo. 952-9277.

'80 DATSUN (Nissan) 280ZX coupe, 5-spd., manual, blue/silver, grand lux. pkg., 139K miles, orig. owner, \$600. 626/577-8107.

'98 FORD Escort SE wgn., white, 68K mi., a/c, 5-spd. stick, new tires, \$4,100. 323/661-3380.

'97 FORD Countour GL, 4 door, taupe, automatic, power windows/locks/steering, am/fm/cass., 55,400 mi., \$6,500. 790-7934.

'96 FORD Windstar, fair cond., V6, automatic, am/fm/cass., pwr windows/door locks/steering, 139K mi, teal color, \$4,800/obo. 626/798-4120.

“What makes the collaboration with Chabot truly beneficial,” said Anita Sohus, JPL informal education lead, “is that the two institutions share goals to engage, inform and inspire people of all ages about Earth and space science.”

JPL also works with the International Planetarium Society, whose quarterly newsletter provides information to more than 750 planetaria worldwide, and has recently included educational material, posters and multimedia products from the Space Infrared Telescope Facility (SIRTF), Mars Exploration Rovers Mission, Space Inteferometry Mission and the Deep Space Network.

“With funding cuts affecting science curriculum, California students can take advantage of other science education opportunities such as after-school programs and camps at science centers, planetaria, and museums,” said Sohus.



Photo courtesy of Anita Sohus

'93 FORD Explorer XLT 4x4, V6, blue, 94K mi., alloy wheels, Bilstein shocks; new: ABS brakes, a/c, leather, JVC stereo/CD; well maintained, vg cond., \$4,800/obo. 626/794-1319.

'93 FORD Taurus LX, green wagon, 3.8L, V6, 81K mi., exc. cond., leather, a/c, am/fm/cass., 3rd row seat, ABS, alarm, full pwr., keyless entry, tilt, luggage rack, \$3,400. 790-8760.

'99 HARLEY DAVIDSON Fatboy by Ultra, custom paint, blk w/dark blue flames, 113 CI, S&S engine, low mileage, extra chrome, exc. cond., many upgrades, fast, \$14K/obo. 909/471-0441.

'99 HONDA Accord LX, blk, 4-door manual transmission, 52K miles, excellent condition, new brakes and tires, \$10,500. 661/644-5648.

'94 HONDA Accord EX 2-door coupe, 100K mi, dark green exterior w/beige cloth interior, sunroof, CD player, automatic, \$5,000; avail. mid-October to early Nov. 323/258.0074, Mal.

'93 HONDA Civic EX coupe, 5-speed, teal green, H22 motor, Nitrous Kit, very fast, new 5-Zigen Fighter Wheels 16X7, new Falken Aze-nis tires; \$5K firm. 244-8822.

'91 HONDA Accord Ex coupe, great cond., green 2-dr., pwr. windows, sunroof, a/c, cassette, manual, 159,000 mi., \$3,500/obo, negotiable. 626/844-8850, 626/744-3243 evenings.

'89 HONDA Civic, 4-door LX sedan, am/fm/cass., air cond., 123K miles, 5-speed manual, 1 owner; sell for \$2,000/obo. 626/403-9112 or 626/590-4600, Katy.

'93 LEXUS ES 300 sedan, orig. owner, pearl color, clean, no accidents, new tires, 5-spd. manual, pwr. steering/seats/windows, cruise ctrl., 67K mi., \$7,565/obo. 626/578-0599, Allan.

'03 MAZDA Miata, white, 87K miles, 1 owner, manual, runs great, very clean, exc. cond., new back window, many extras, pictures available, \$4,200/obo. 626/351-9150, Leslie.

94 MAZDA Miata, exc. cond., white/tan, 5 spd., ac/ps/pb, leather, pwr windows/mirrors/ant., chrome whls, glass rear window, garaged, 90k mi, maint. receipts, \$4,750. 626/844-9000.

'84 MAZDA RX-7 GS, 5-speed manual, 91K miles, runs good, stored, no current license, \$650. 626/357-7347.

'97 TOYOTA Corolla, exc. cond.,55,000 mi., mostly highway, automatic trans., a/c, \$5,500. 626/396-1767, Mike; 626/818-0135, cell.

'92 TOYOTA Camry LE, 4-dr., burgundy/gray, 123K miles, 4-cylinder, auto, a/c, pwr. s/b/windows, clean, well-maint., 1-family owned, no accidents; \$3,200 firm. 626/797-5807 after 6.

'99 VW Passat GLS, exc. cond., lo mi., white/blk, auto, 1.8 Turbo triptronic, a/c, pw, pl, ps, tint, alm, 6 CD, \$12,700. 310/435-2603.

'99 VW Passat GLS sedan 4D, 70K mi., black exterior w/tan cloth interior, tinted windows, sunroof, CD changer, automatic; \$10,500, avail. mid-Oct. to early Nov. 323/258-0074, Carl.

Free

LEFTOVER LUMBER, you haul. 626/791-6048.

Wanted

OFFICE DESK, light wood or metal, approx. 48-54" wide, 28 1/2" high, 24" deep. 248-0869 or 249-1986, Bruce.

SINGERS for informal singing group. Wednesdays, 233-303 at noon.

SPACE INFORMATION/memorabilia from U.S. & other countries, past & present, for personal use. 790-8523, Marc Rayman.

STORAGE, secure, for nice-looking '92 Honda Accord until end of May 2004 in Sierra Madre/ Arcadia/Pasadena/Alt. area; will cover, can pay up to \$30/mo. 626/355-5457 or 626/297-3107.

SURFBOARD, used, 9 ft. or longer. 957-2852.

VOLLEYBALL PLAYERS, co-ed, no beginners please; Tues. nights 8-10:00 at Eagle Rock High School; \$4/night. 956-1744, Barbara.

For Rent

ALTADENA room, kitchen privileges, pool, \$400. 626/345-0692 after 6 p.m.

E. HOLLYWOOD, lg. single apt., 1 block/Metro & shopping; util. pd.; stove, ref., sec. bldg., newly decorated; \$700. 310/ 377-0316, Gerri.

GLENDALE, townhome-like duplex, 2 bd, 1.5 ba., din. rm., liv. rm., priv. patio, marble floor; family neighbrrhd., close to JPL; \$1,200. 956-2234, Rose.

GLENDALE guest house, nice 1 bd., 1 ba., stove, washer/dryer, 11 miles from JPL, \$900 + elec., water/gas included. 240-0131.

LA CANADA, 1 bd. apt., very close to JPL, La Canada School address, next to Caltech Credit Union, across from shopping and Starbucks, \$1,000. 952-4444, ext. 201.

PASADENA townhouse, large, 3 bd., 2.5 ba., central air & heat, washer/dryer hookups, fireplace, walk to Goldline; new carpet, linoleum, stove; covered parking, no smoking or pets; \$1,800, water & trash incl. 626/394-5946.

PASADENA, exceptional condo nr. major shopping, restaurants, Caltech & JPL; 2 master bd. each w/ba.; 3 story w/1/2 ba. on main level, attached 2-car gar. with w/d hook-up; fireplace, cent. air, gas appliances, Pergo floors on main level w/custom plantation shutters; priv. entry w/patio; \$1,700 + \$2,000 security deposit. 626/568-3643.

PASADENA house, 3 bd., 2 ba., in San Rafael Hills, newly remodeled, owner occupied, hardwood floors throughout, granite kitchen countertops and travertine flooring, stainless steel appliances, central a/c, heat, marble guest ba., 1.5-car gar., plenty of driveway parking, incl. weekly garden service, w/d, refrigerator, and more; furn. for \$2,750; avail. mid-October for 1-year lease, \$2,450. 323/258-0074, Carl.

PASADENA, spacious 2-story condo, 3 bd., 2.5 ba., prestigious community, beaut., inter., bright ktch., prof. landscape, ctrl. air & heat, close to shop., cozy LR w/fp, end unit, frml DR, hdwd. flrs., immac. cond., close to schls; \$1,750. 626/396-9024.

PASADENA, furn. & unfurn. townhome-style apts., 2 bd., 1.5 ba., patio, dishwasher, cent. a/c, new carpet & floors, refrig. & stove, laundry, parking, close to Caltech & JPL; \$1,295-\$1,350 + util. 626/577-3060, ext 14, Dennis.

PASADENA, furnished apt. to share w/JPLers; 3 bd., 3 ba., townhome-style with patio, central a/c, laundry, close to Caltech & JPL, \$650 plus util. 626/577-3060 ext. 14, Dennis.

PASADENA, renovated 3 bd., 2 ba., house, new kitchen/windows/copper plumbing/paint; hrdwd. floors in living & din. rooms; lg. front porch; water/trash/gardener/parking incl.; close to JPL/Caltech/PCC/Goldline; \$1,850. 590-2793.

SIERRA MADRE, cyn. duplex, 2 bd., 1 full ba., upstairs duplex unit, lg. covered terrace, garage, quiet setting, laundry facilities; no pets, no smoking, water/trash/laundry/gardener incl.; avail. 11/01 or sooner; \$1,650. 626/836-9120.

SIERRA MADRE, cyn. home, 2 bd., 1.5 ba. w/priv. patio, 2 parking spaces, laundry hookups, quiet garden setting; water/trash/gardener incl.; no pets/no smoking; \$1,570. 626/836-9120.

SUNLAND, fully furn. room in condo; share kitchen/bath/laundry; garage parking, a/c, fireplace, pool, Jacz., tennis court; 10 mi. to JPL; female preferred, non-smoking; \$500 incl. util.; \$400 security deposit; references. 352-3112.

Real Estate

ALTADENA, 1 story trad., 2 bd., 2 ba., 1,300 sf., LR, DR, den could be 3rd bdrm., 2-car gar., central a/c, 2 FP, modern kitchen, hardwood floors; 2 mi. east of JPL, on quiet cul-de-sac with mtn. views; \$369K. 790-0308, Beatrice.

Vacation Rentals

BIG BEAR LAKEFRONT, luxury townhome, 2 decks, tennis, pool/spa, beautiful master bd., suite, sleeps six. 949/786-6548.

CABO SAN LUCAS, Valentine's wk. getaway, junior suite at Pueblo Bonito Resort, slps 4, balcony w/panoramic vw. of Sea of Cortez, kitchenette, a/c, satellite TV, on white sand beach, lg. freeform pool w/island & waterfall, fitness ctr., 2 restaurants, dell. beauty shop, maid service, bilingual staff; 80 F ocean temp, \$800 for wk. of 2/9/04, www.pueblobonito.com. 626/296-8633, Todd.

DEL MAR, fully furn. condo, 7 nights 11/15-11/22/03; slps 6, 2 bd., 1 & 1/2 ba., living rm., full ktchn., cable tv/cvr, game room, sauna, pool/spa, laundry rm., bbq area, walk to race track and beach; JPL discnt. 626/961-8771.

HAWAII, Maui condo, NW coast, ocean front view, 25 ft. fr. surf, 1 bdrm. w/loft, compl. furn. phone, color TV, VCR, microwave, d/w, pool, private lanai, slps 4, laundry fac., low season rate \$105/night/2, high season rate \$120/night/2, \$15/night/add'l person. 949/348-8047, jackandrandy@cox.net.

MAMMOTH, Snowcreek, 2 bd., 2 ba., +loft, slps. 6-8, fully equip'd kitchen incl. microwave, D/W, cable, VCR, phone, balcony w/mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL disc'nt. 626/798-9222, 626/794-0455 or valerie@gps.caltech.edu.

OCEANSIDE condo, fully furn., 2 bd., 2 ba., fireplace, full kitchen; quiet, relaxing, beautiful beachside setting; BBQ, pool, spa, game room, great ocean view; easy walk to pier & restaurants; slps. 8; avail. weekly or monthly. 909/981-7492 Darlene or dfhaug@yahoo.com.

OCEANSIDE, on the sand, charming 1 bdrm. condo, panoramic view, walk to pier or harbor; pool/spa, game rm., sleeps 4. 949/786-6548.

'01 PACE ARROW, 34-foot RV; queen, sofa and dinette beds; monthly rentals only, \$3,000 in advance + \$1,000 security deposit; you pay insurance and gas; JPL employees only; no smoking or pets. tahoenike@earthlink.net, 530/525-7334.

ROSARITO BEACH condo, 2 bd., 2 bth., ocean view, pool, tennis, short walk to beach on private rd., 18-hole golf 6 mi. away, priv. secure parking. 626/794-3906, Patrick.